

| BASIC CATEGORY | PHYSICAL FEATURE | METHOD AND/OR MEDIUM | MERITS | DEMERITS (DRAWBACKS OF THE RELATED ART) |
|-------------------------|---|--|---|---|
| CONTACT | DIRECT CONTACT BY CONDUCTOR | SIMPLE, ECONOMICAL | CONTACT, SHORT IN SERVICE LIFE LARGE LIMITATION OF COMMUNICATION RANGE | |
| | PHYSICAL OSCILLATION | SIMPLE, ECONOMICAL | CONTACT, SHORT IN SERVICE LIFE LARGE LIMITATION OF COMMUNICATION RANGE | |
| PROXIMITY COMMUNICATION | ELECTROMAGNETIC WAVE (RADIO) | SMALL LIMITATION OF COMMUNICATION RANGE COMMUNICATION AT HIGH SPEED, POSSIBLE | LARGE INTERFERENCE WITH ELECTRONIC CIRCUIT LOW SECURITY | |
| | SHORT-RANGE SPATIAL TRANSMISSION OF LIGHT | SMALL INTERFERENCE WITH ELECTRIC CIRCUIT COMMUNICATION AT ULTRA-HIGH SPEED, POSSIBLE HIGH SECURITY | LARGE LIMITATION OF COMMUNICATION RANGE | |
| NONCONTACT | AIR VIBRATION (SOUND) | SIMPLE, ECONOMICAL SMALL INTERFERENCE WITH ELECTRIC CIRCUIT | COMMUNICATION AT HIGH SPEED, NOT POSSIBLE | |

501 FIG. 1 (Prior Art)

OPTICAL PROXIMITY SPATIAL
TRANSMISSION SYSTEM, Tomohiro
Ikegami
Docket No. S01459.70055.US

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|-------------------|------------------|-------------------------------|---|---|------------------------------------|
| | | | | HIGH-SPEED COMMUNICATION DEPENDS UPON COMMUNICATION DISTANCE | INTERFERENCE WITH ELECTRIC CIRCUIT |
| TELECOMMUNICATION | CONTACT | CONDUCTOR OR CABLE | SIMPLE, ECONOMICAL, COMMON | RELATIVELY EXPENSIVE | ALIGNMENT OF COUPLINGS, DIFFICULT |
| | | OPTICAL FIBER | SMALL INTERFERENCE WITH ELECTRIC CIRCUIT COMMUNICATION AT ULTRA-HIGH SPEED, POSSIBLE | | |
| | NONCONTACT | ELECTROMAGNETIC WAVE (RADIO) | SMALL LIMITATION OF COMMUNICATION RANGE SIMPLE, ECONOMICAL, COMMON | LARGE INTERFERENCE WITH ELECTRONIC CIRCUIT LOW SECURITY | NOISES FROM SURROUNDING EQUIPMENT |
| | | SPATIAL TRANSMISSION OF LIGHT | SMALL INTERFERENCE WITH ELECTROMAGNETIC WAVE HIGH SECURITY | | |
| | | AIR VIBRATION (SOUND) | SIMPLE, ECONOMICAL SMALL INTERFERENCE WITH ELECTRIC CIRCUIT | COMMUNICATION RANGE, SHORT COMMUNICATION AT HIGH SPEED, NOT POSSIBLE | |
| | | | | | |

FIG. 2 (Prior Art)

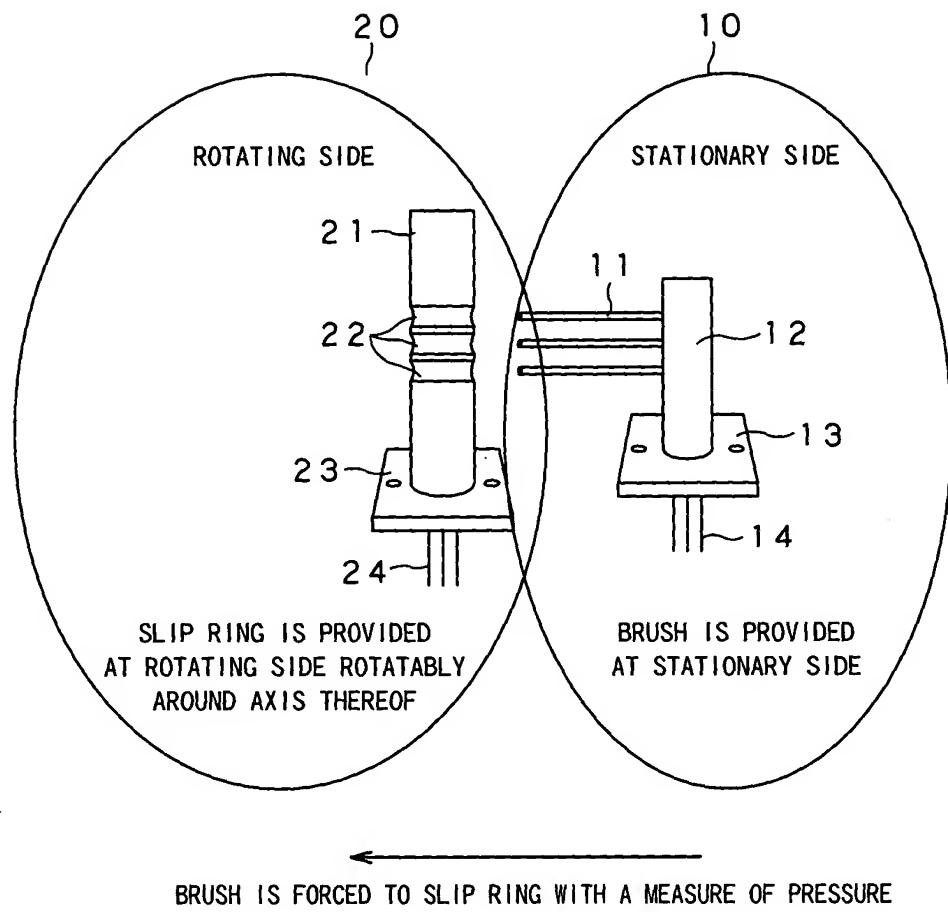


FIG.3(Prior Art)

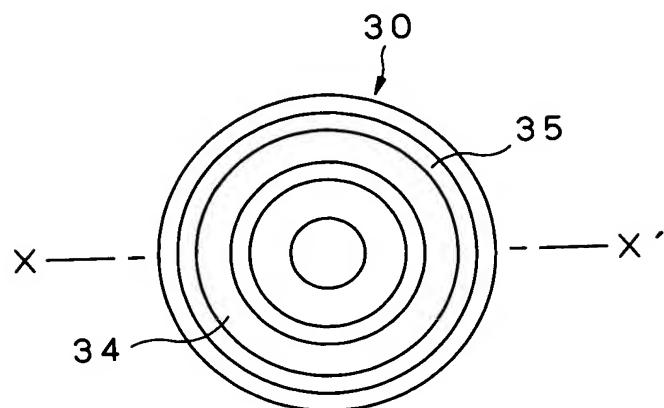


FIG. 4A(Prior Art)

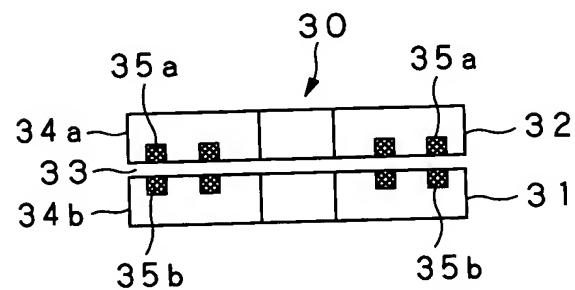


FIG. 4B(Prior Art)

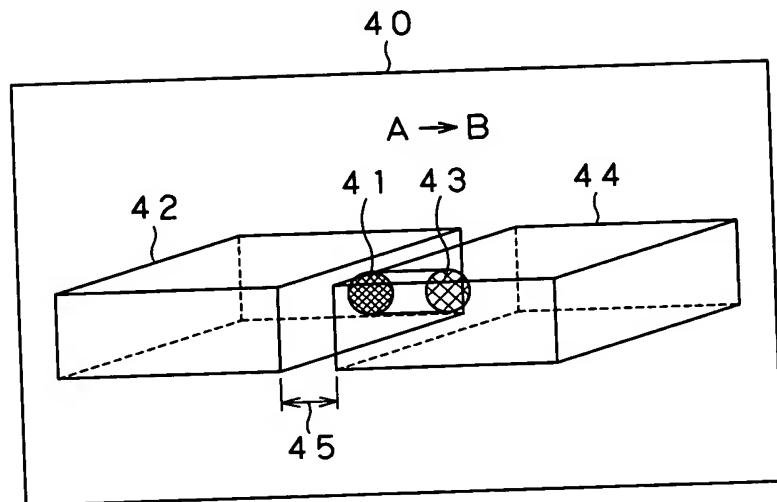


FIG.5

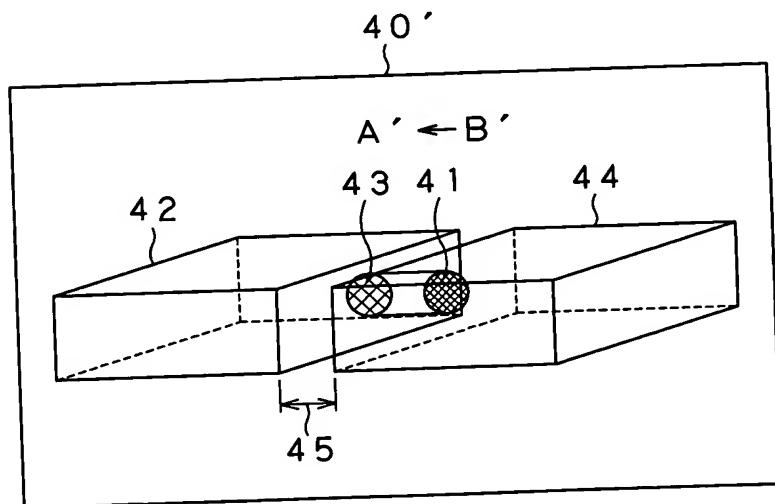


FIG.6

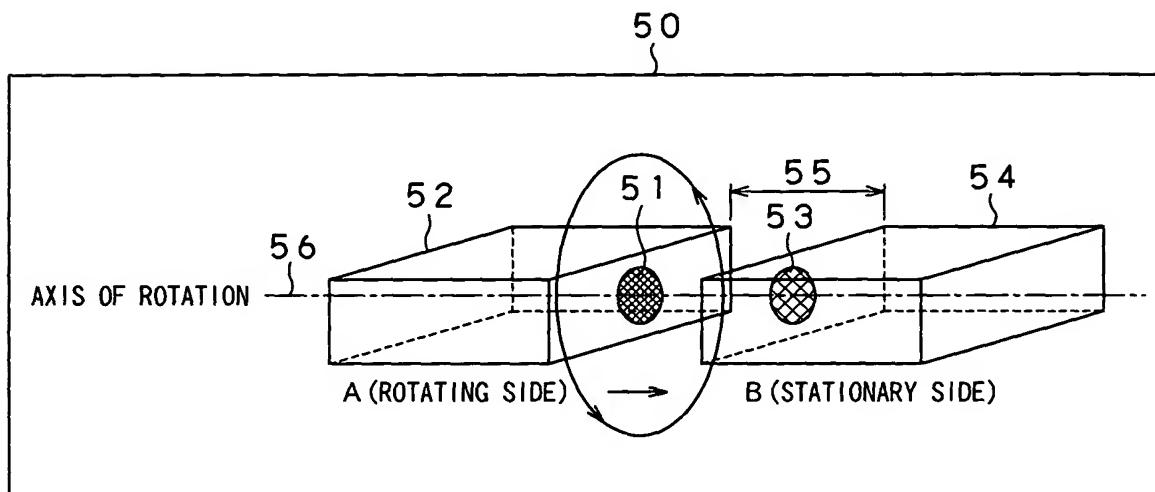


FIG. 7

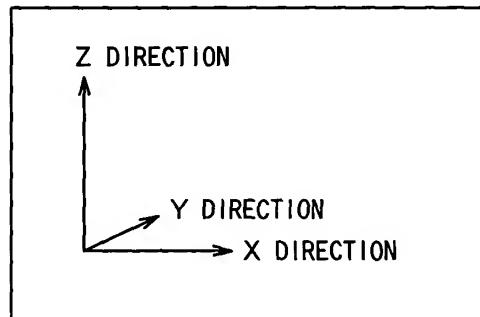


FIG. 8

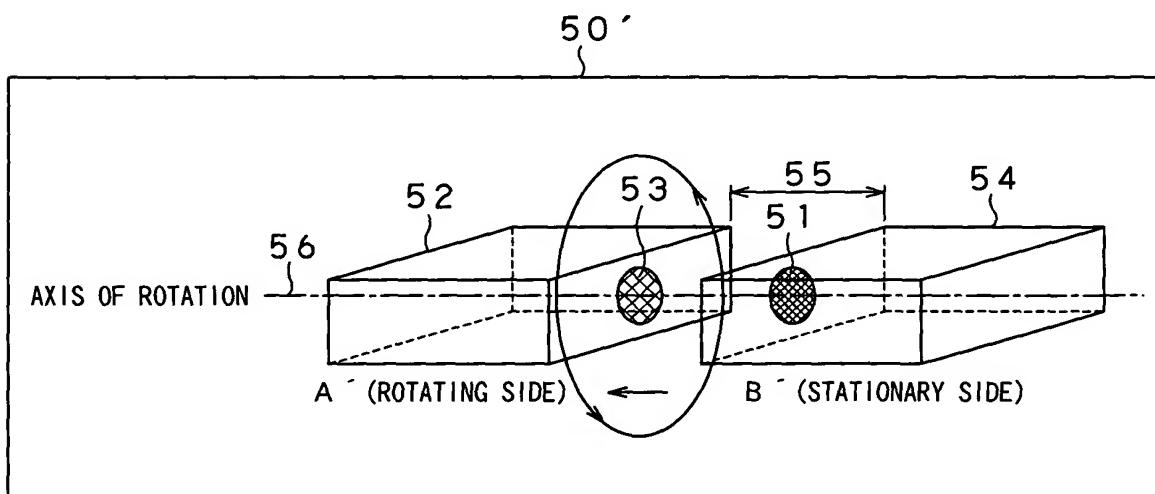
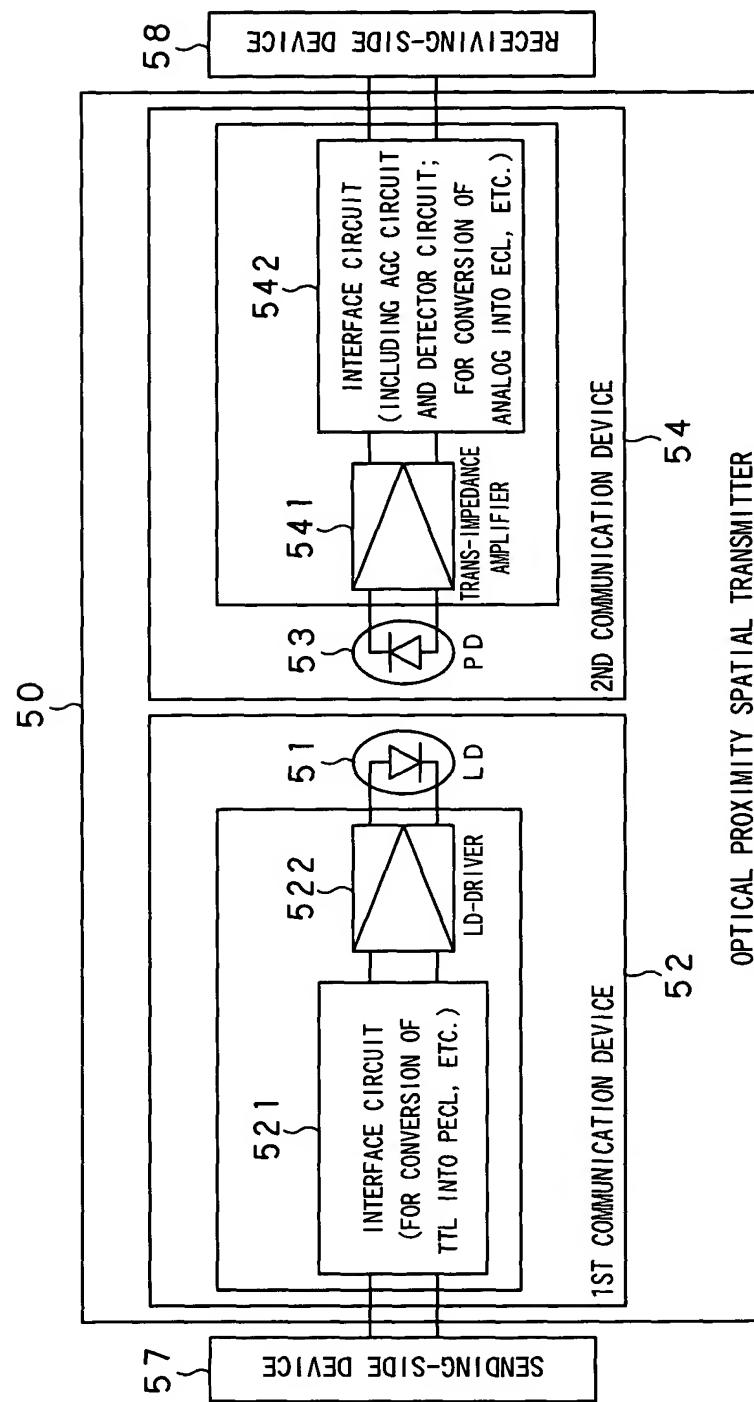
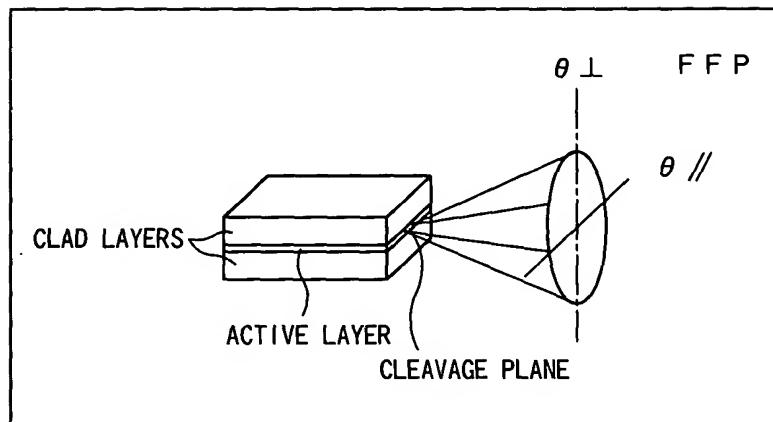


FIG. 9

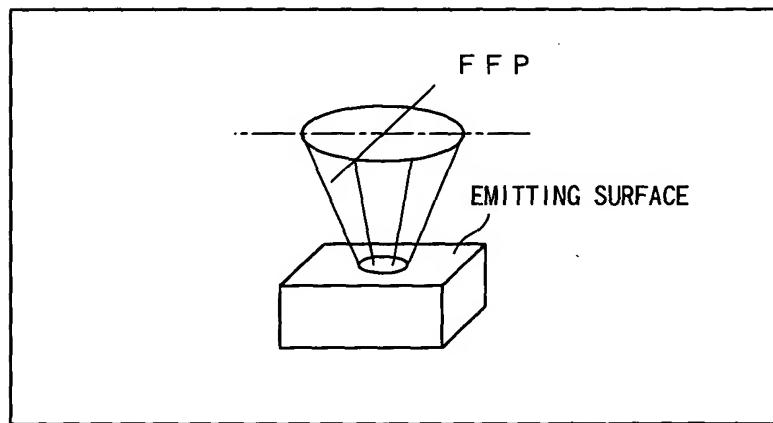


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FFP : ELLIPTIC (GENERALLY, $\theta \parallel \approx 10^\circ$, $\theta \perp \approx 30^\circ$)

FIG.11A



FFP : CIRCULAR (GENERALLY, $\theta \approx 10^\circ$)

FIG.11B

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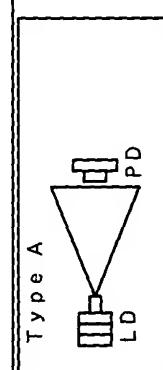
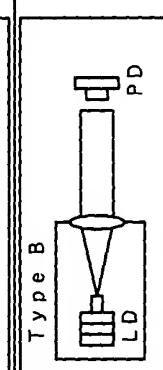
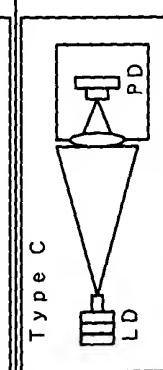
| | EFFICIENCY | SPATIAL TRANSMISSION DISTANCE | X-AXIAL PHOTODETECTION WIDTH | Y- AND Z-AXIAL PHOTODETECTION WIDTH | APTITUDE | ECONOMICAL EFFICIENCY |
|--|------------|-------------------------------|------------------------------|-------------------------------------|---|-----------------------|
| TYPE A: LD AND PD ARE DIRECTLY OPPOSITE TO EACH OTHER (IMPRactical) | - | - | - | - | X | - |
| Type A  | | | | | | |
| TYPE B: LD WITH LENS IS OPPOSITE TO PD | △ | ○ | ○ | △ | FOR SYSTEM IN WHICH OSCILLATION IN DIRECTION OF OFF-AXIS DEVIATION IS SMALL | ○ |
| Type B  | | | | | | |
| TYPE C: LD IS OPPOSITE TO PD WITH LENS | △ | △ | △ | ○ | FOR SYSTEM IN WHICH OSCILLATION IN DIRECTION OF OFF-AXIS DEVIATION IS LARGE | ○ |
| Type C  | | | | | | |

FIG. 12

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| | EFFICIENCY | SPATIAL TRANSMISSION DISTANCE | X-AXIAL PHOTODETECTION WIDTH | Y- AND Z-AXIAL PHOTODETECTION WIDTH | APTITUDE | ECONOMICAL EFFICIENCY |
|--|------------|-------------------------------|------------------------------|-------------------------------------|--|-----------------------|
| Type D: LD WITH LENS IS OPPOSITE TO PD WITH LENS | ○ | ○ | ○ | △ | FOR SYSTEM IN WHICH SPATIAL TRANSMISSION DISTANCE IS LONG | △ |
| Type E: LD WITH LENS IS OPPOSITE TO PD WITH LENS (SPOT DIAMETER AT LD IS LARGER THAN DIAMETER OF LENS AT PD) | △ | ○ | ○ | ○ | FOR SYSTEM IN WHICH SPATIAL TRANSMISSION DISTANCE IS LONG AND ALSO OSCILLATION IN DIRECTION OF OFF-AXIS DEVIATION IS LARGE | △ |
| Type F: LD WITH LENS IS OPPOSITE TO PD WITH LENS (SPOT DIAMETER AT LD IS SMALLER THAN DIAMETER OF LENS AT PD) | ○ | ○ | ○ | ○ | FOR SYSTEM IN WHICH SPATIAL TRANSMISSION DISTANCE IS LONG AND ALSO OSCILLATION IN DIRECTION OF OFF-AXIS DEVIATION IS LARGE | △ |

FIG. 13

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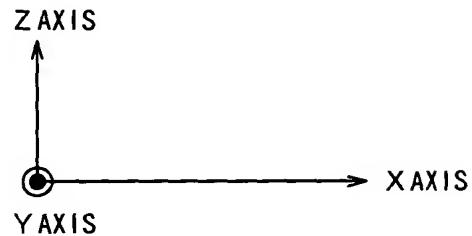


FIG. 14

FIG. 15A

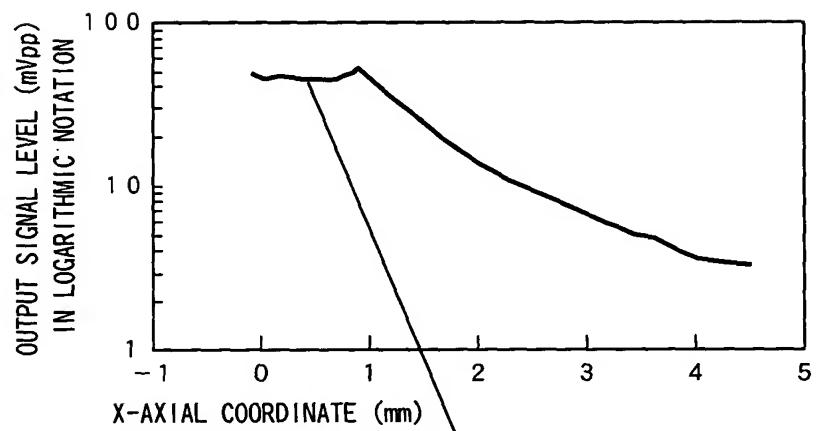
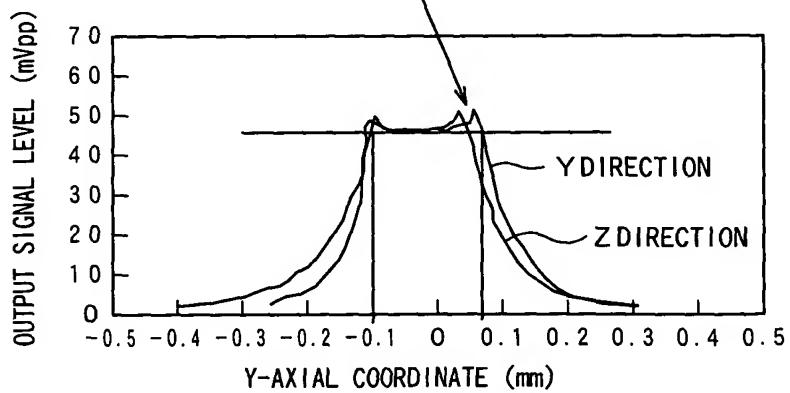


FIG. 15B



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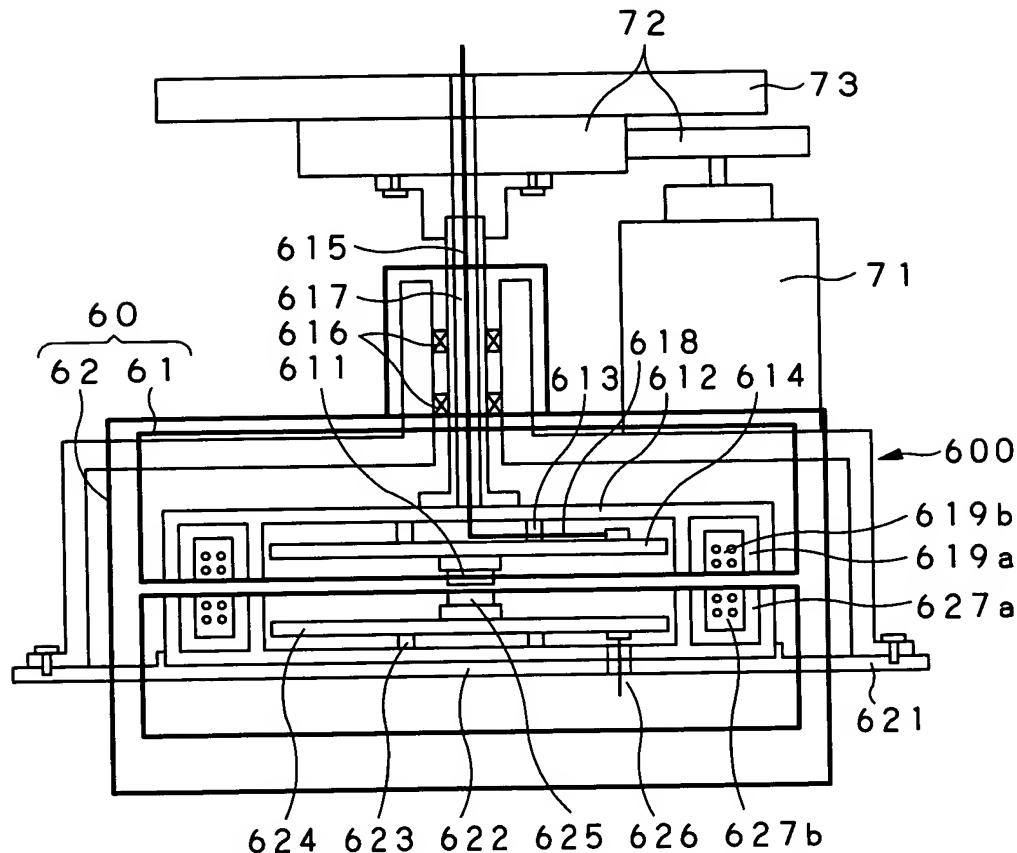


FIG. 16

**OPTICAL PROXIMITY SPATIAL
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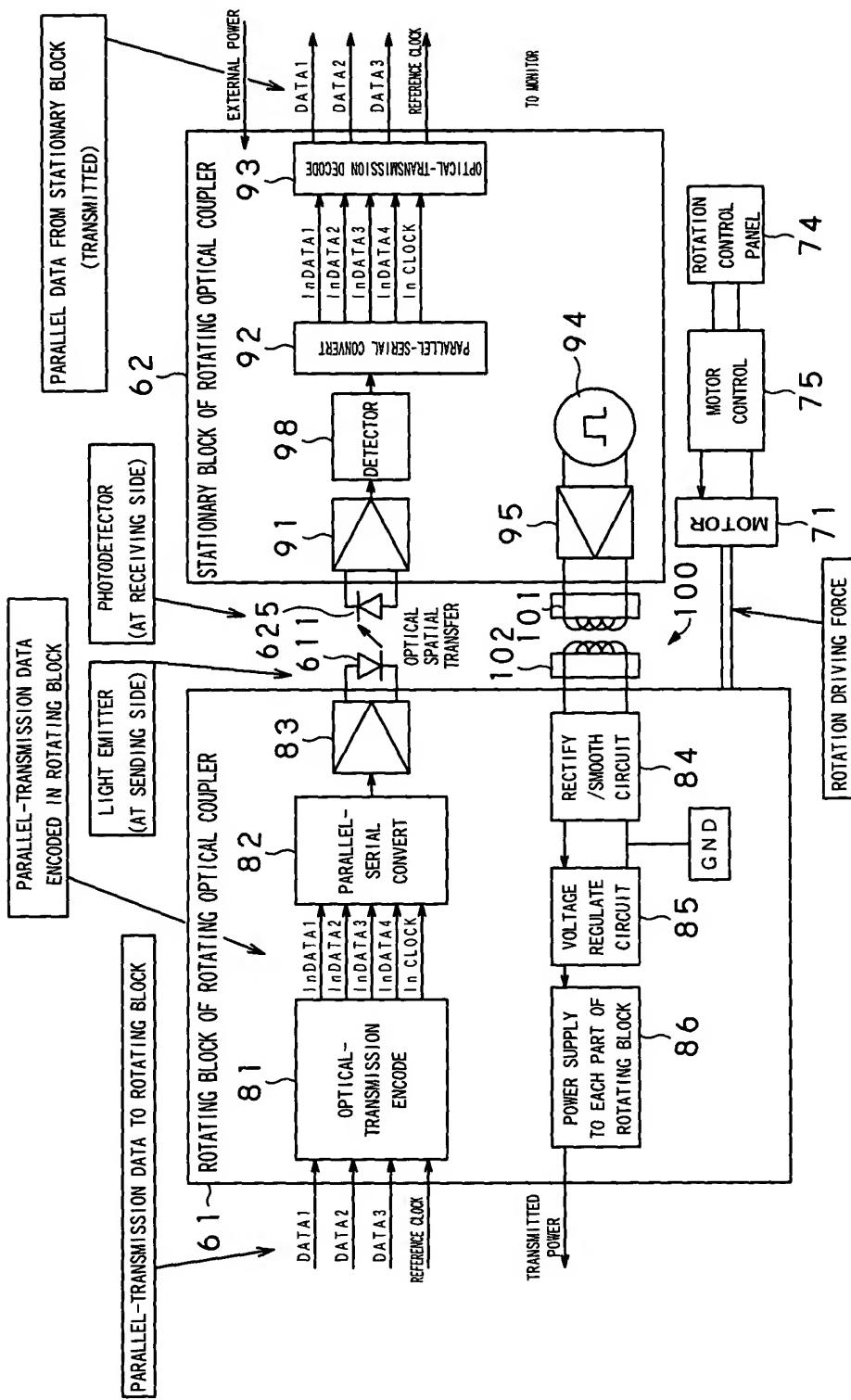


FIG. 17

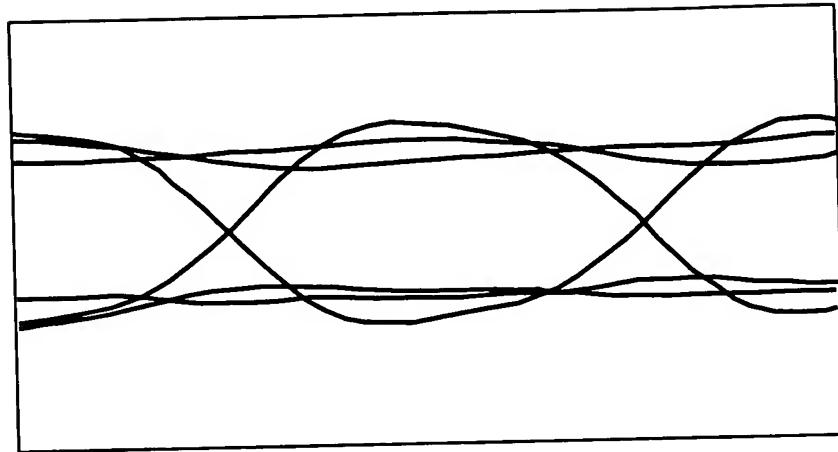


FIG. 18

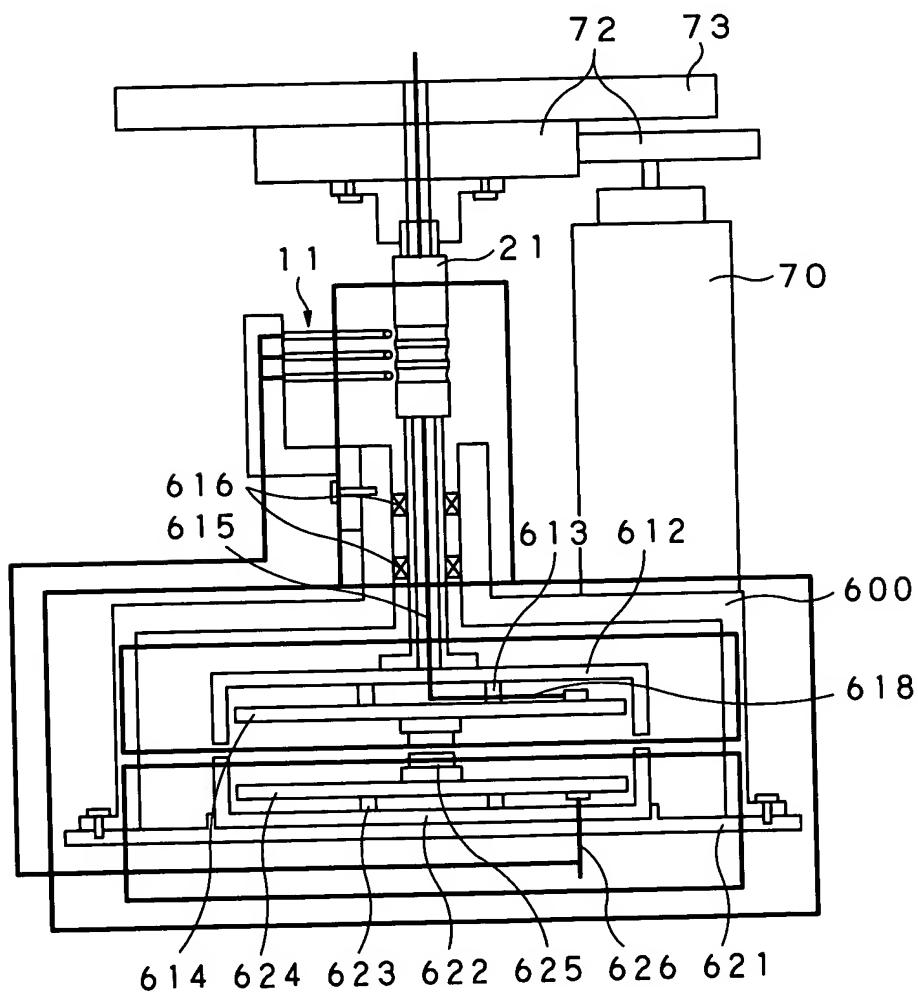


FIG. 19

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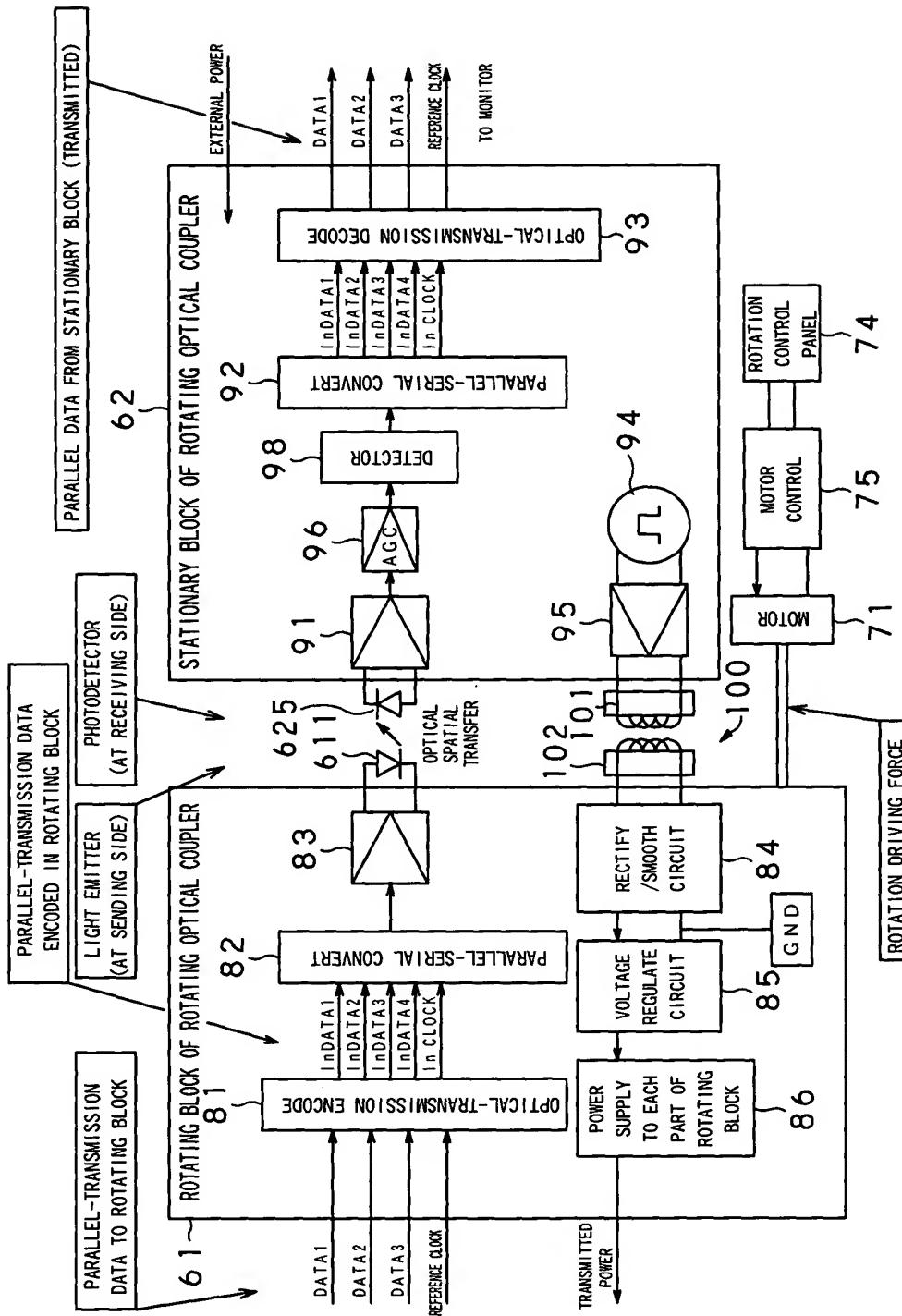


FIG.20

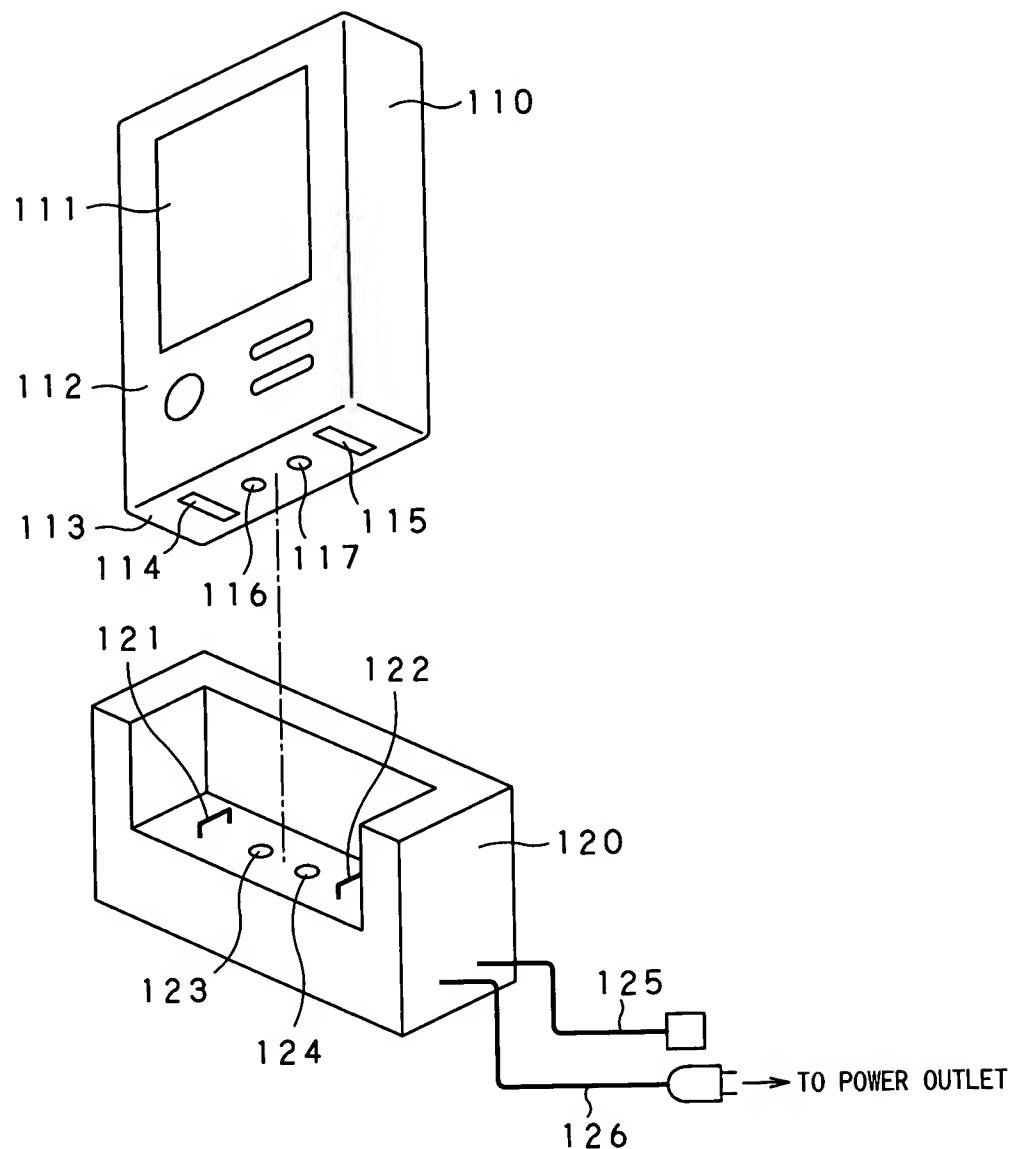


FIG. 21

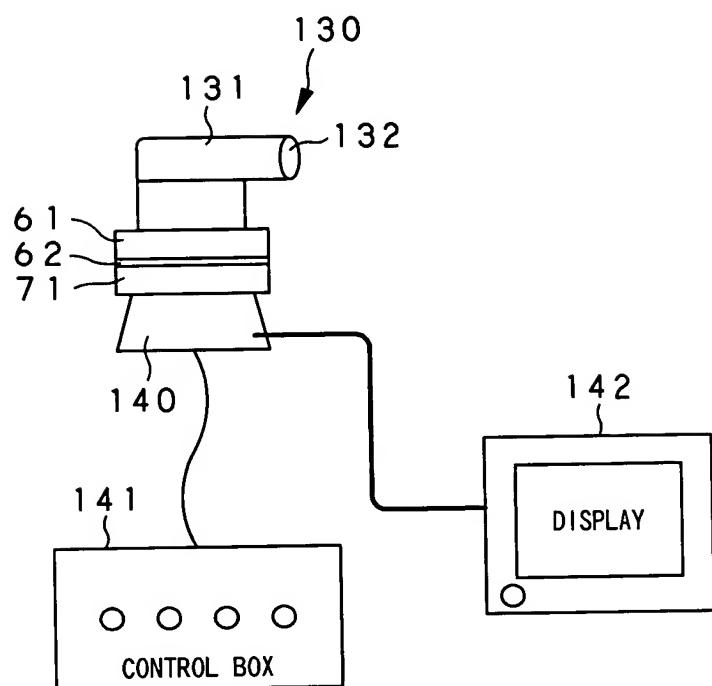
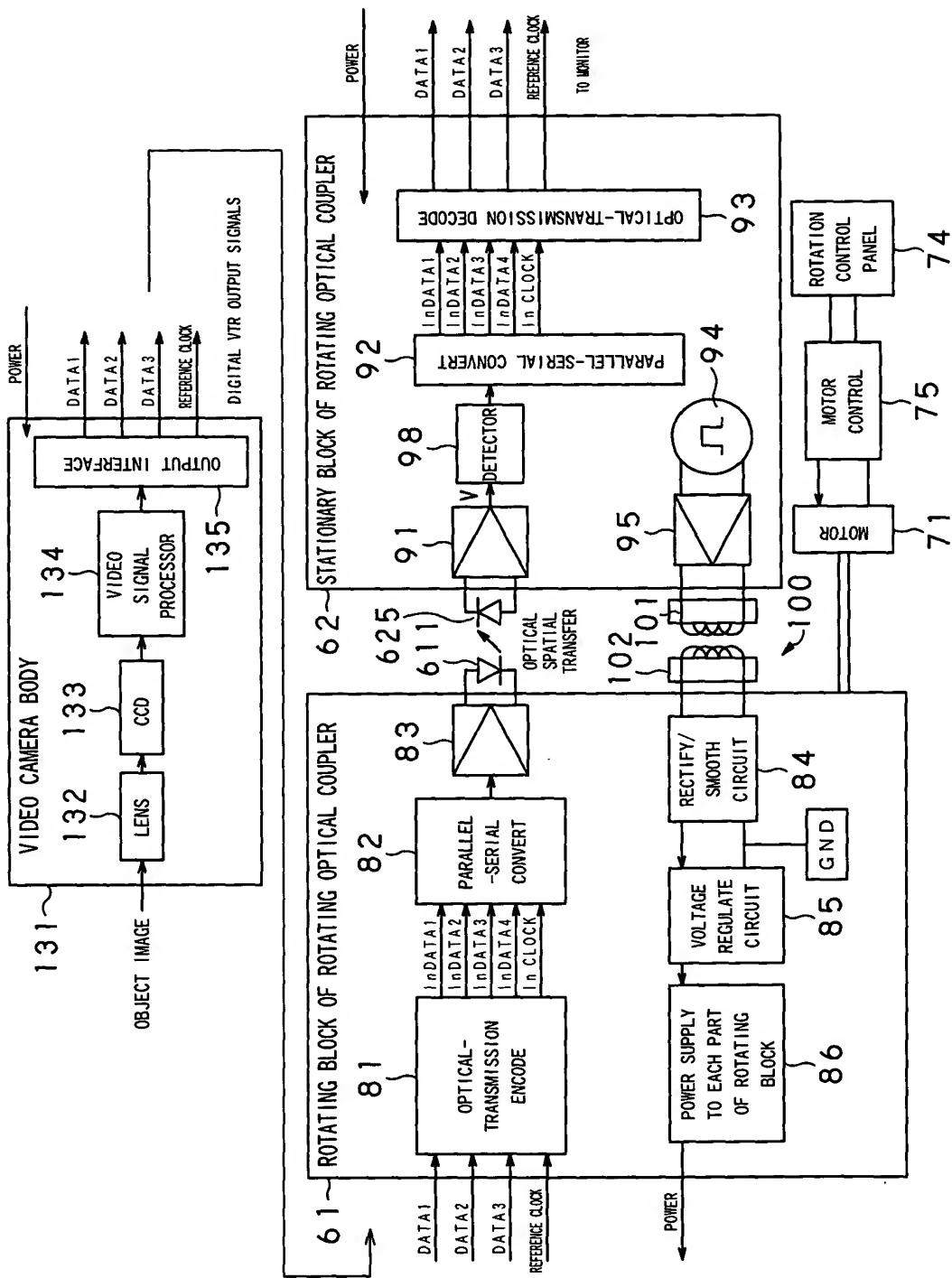


FIG.22

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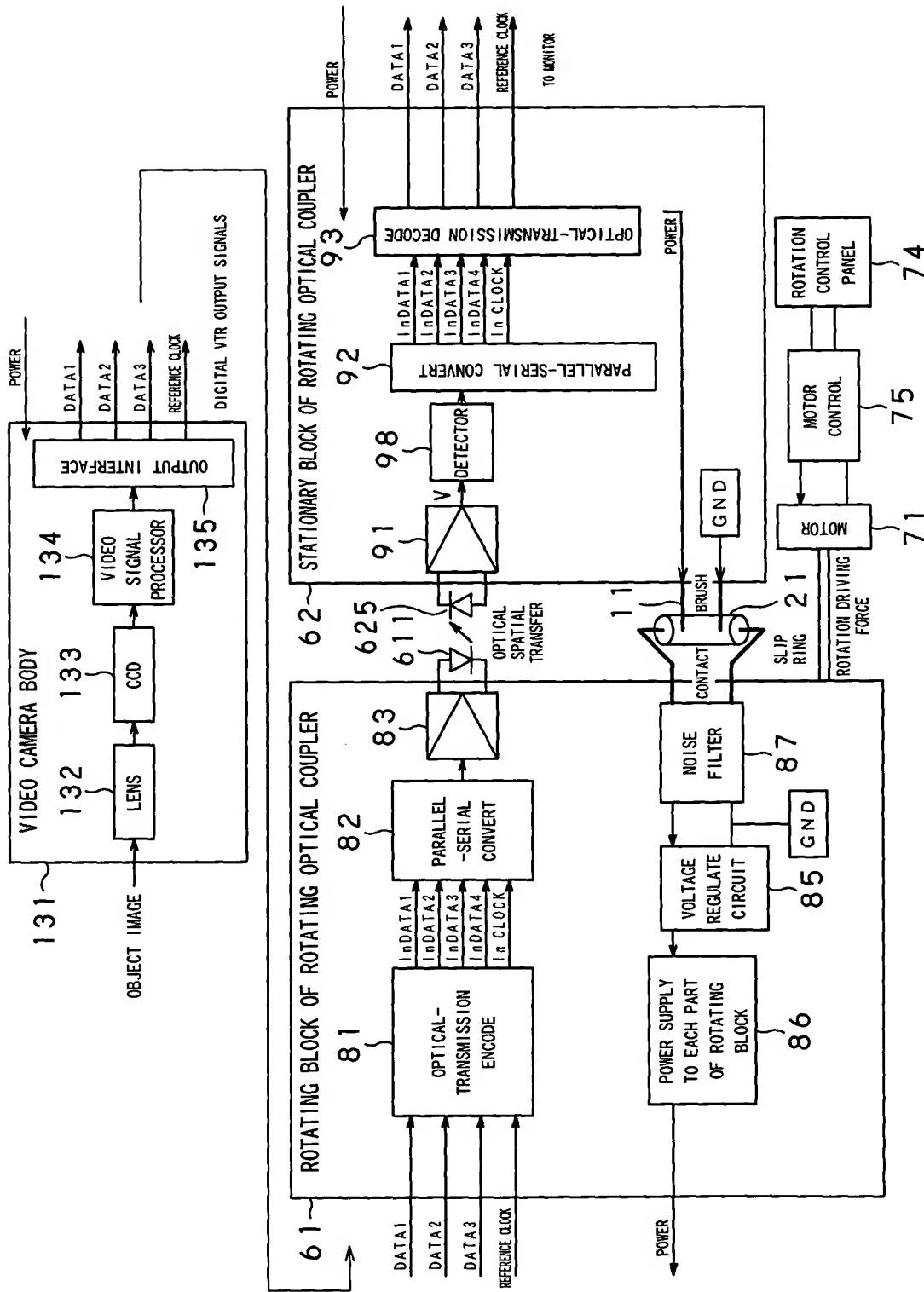


FIG.24

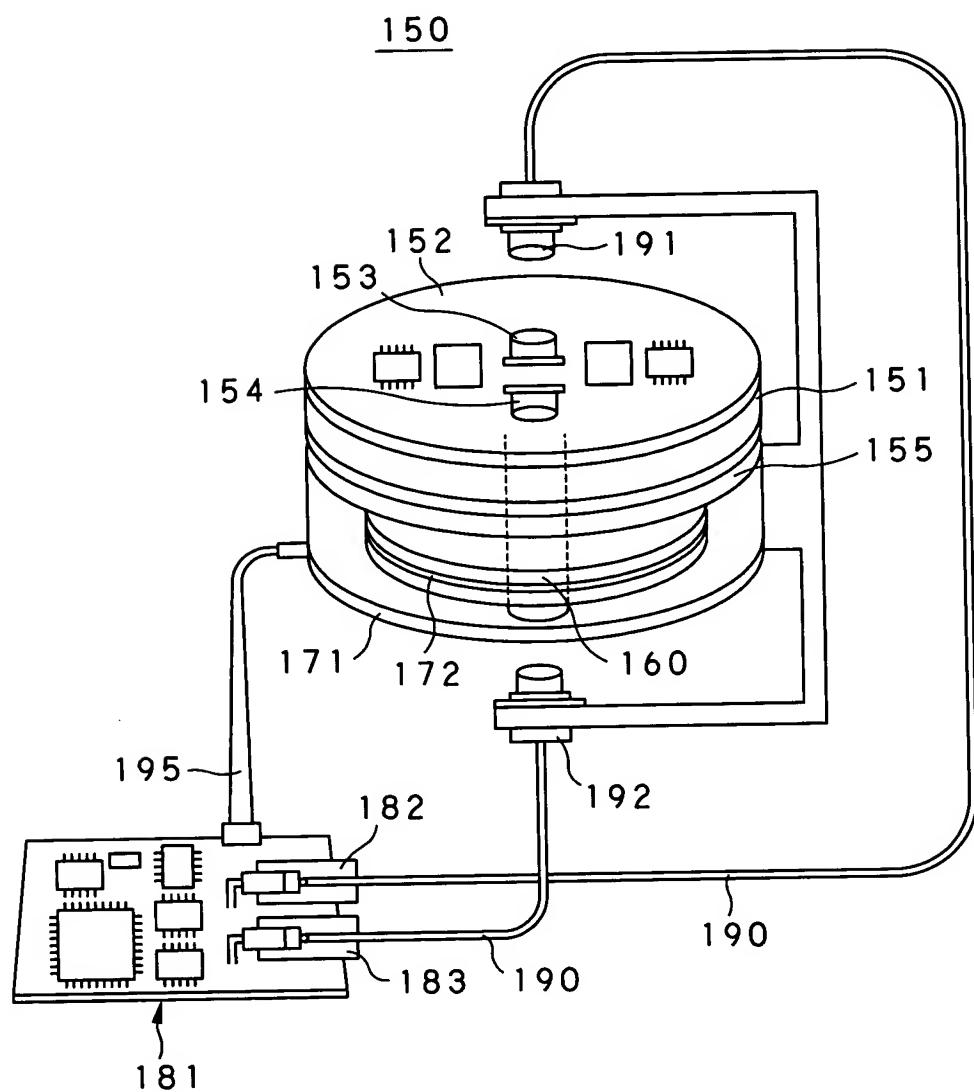


FIG.25

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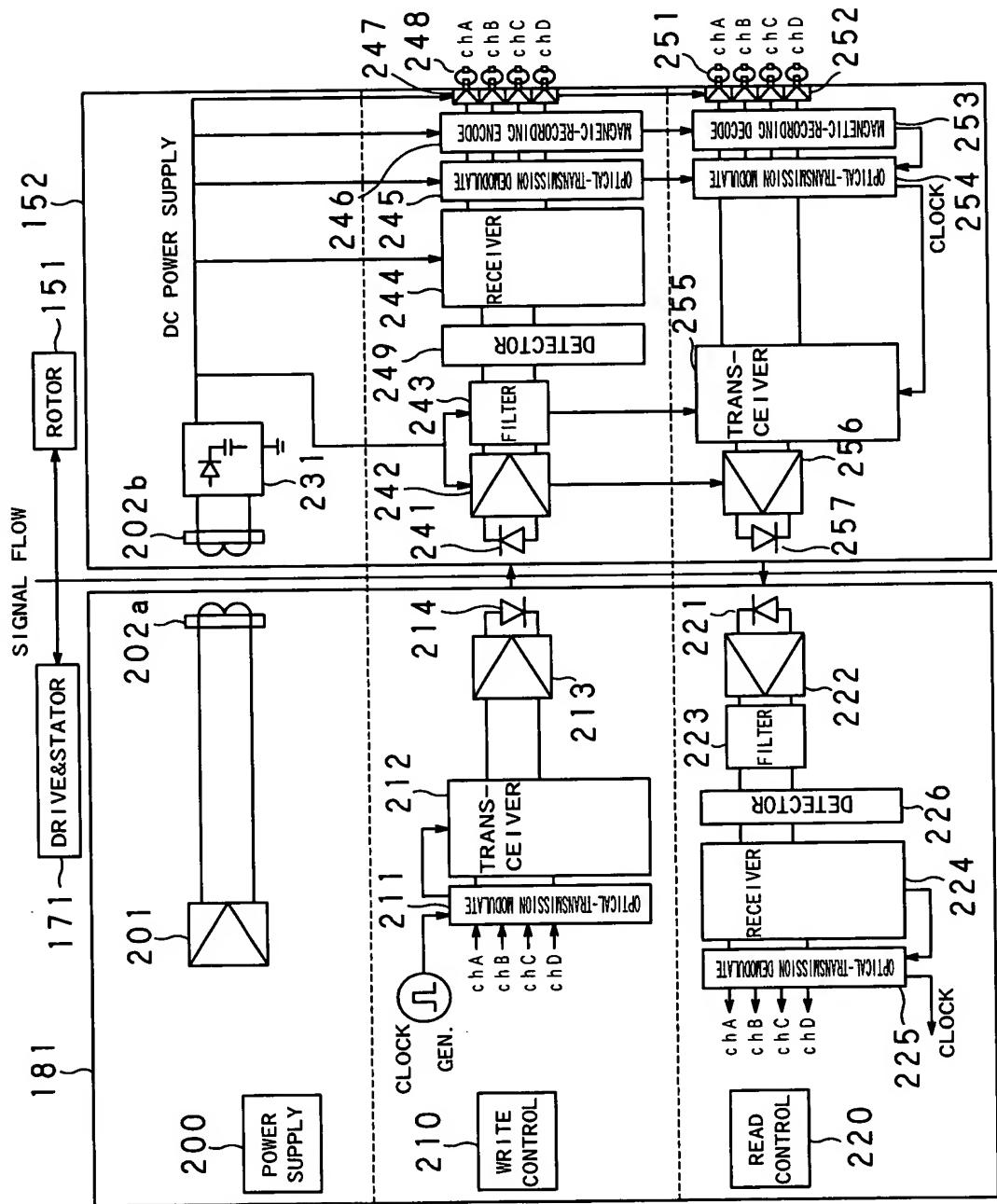


FIG. 26

FIG.27A

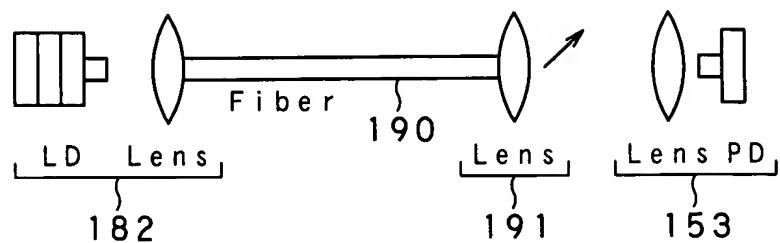


FIG.27B

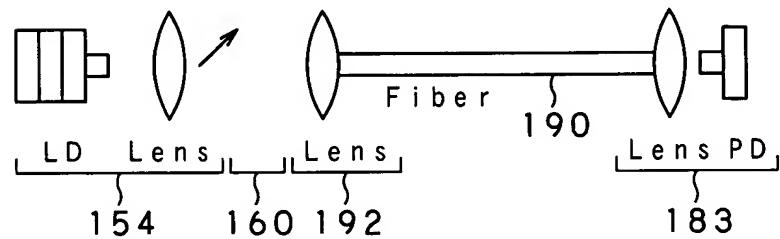


FIG.28A

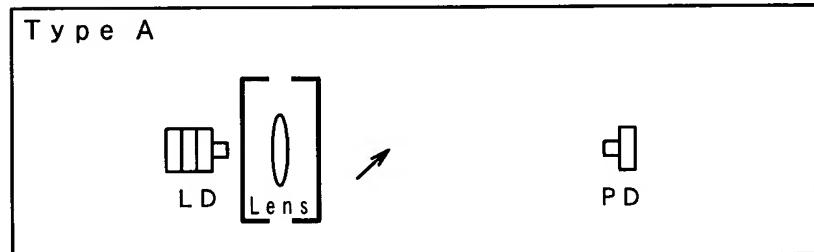


FIG.28B

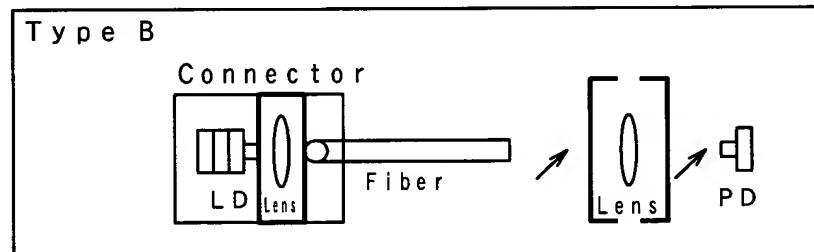


FIG.28C

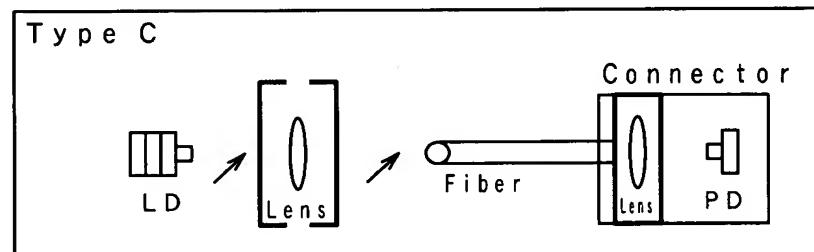


FIG.28D

